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Cost Trends and Affordability of
Automobile Insurance in the U.S.

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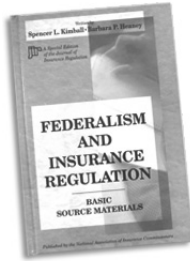
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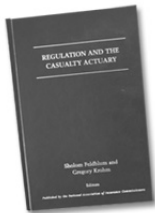
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Cost Trends and Affordability of Automobile Insurance in the U.S.

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Abstract

We consider the affordability of auto insurance in light of recent increases in its cost. We show that increases in the cost of insurance are correlated with increases in the cost of losses, not with changes in insurer profits. We review the existing literature on the affordability of auto insurance and describe the inherent difficulties of evaluating affordability. We also highlight important limitations in the assumptions and methodologies used in past affordability studies. Finally, we conclude that rate regulation is not an appropriate tool for addressing the affordability of auto insurance.

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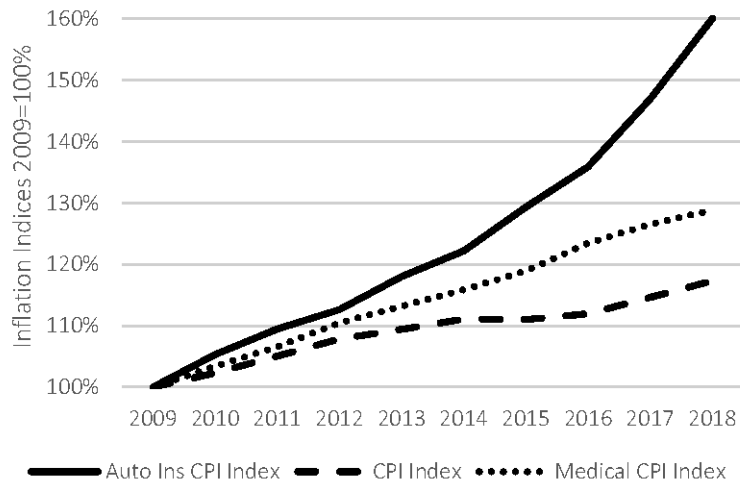
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Introduction¹

Automobile insurance represents a significant expense for some drivers in the U.S. In 2017, auto insurance premiums represent 12.6% of transportation expenses and just under 1.7% of total annual expenditures for low-income households. The cost of automobile insurance has increased from 2009 to 2018. Figure 1 shows that automobile insurance costs have risen faster than general inflation and medical inflation from 2009 through 2018. Hartwig et al. (2016) note that it is common for automobile insurance prices to decrease during a recession and increase quickly after. This may be caused by the correlations among driving, income and employment.

Figure 1: Automobile Insurance Inflation: 2009–2018



Source: Bureau of Labor Statistics

The increase in the cost of auto insurance relative to other goods and services motivates our study. We examine the factors driving cost increases and the effects of cost increases on affordability to determine if a public-policy response is appropriate and, if so, what an optimal response should involve. For example, if the rising cost of auto insurance coincides with windfall profits for insurance companies, enhanced rate regulation might be effective. If cost increases reflect increases in dangerous driving behavior or conditions, investments in law

1. The authors appreciate financial support from the Insurance Information Institute.

enforcement or transportation infrastructure would be more appropriate. If cost increases are caused by increases in underlying components of automobile insurance costs (e.g., automobile repair, medical care, and legal services), perhaps a practical solution would target these factors instead of insurance.

We also consider the affordability of auto insurance. We define an affordable good as one that is not too expensive for people of limited means to purchase. Given the importance of personal vehicles for transportation in many areas and the legal and moral imperatives for drivers to carry insurance, many people believe affordability of auto insurance for all income levels is an appropriate public-policy goal. However, Schmid (2014) notes that "... affordability is not a straightforward subject to study, nor does it have a uniform methodological framework." Thus, we review existing studies of auto insurance affordability and perform new analyses to inform policymakers on this topic.

As a preview of the results, we find that the cost of auto insurance has increased in recent years. We find that the recent increase in the cost of auto insurance is strongly correlated with increases in the frequency and severity of auto accidents. The increase in the frequency and severity of auto accidents is likely due to increases in the miles driven during a period of economic expansion. The evidence also points to distracted driving, the increasing cost of collision repair and medical cost inflation as contributing factors.

Some of the contributing factors, such as crash repair costs, should partially self-correct over time. Once a critical mass of the vehicle fleet has crash-avoidance technology, the reduction in loss frequency should offset at least part of the increase in loss severity. Other factors, like the cost of medical care and related non-economic damages (e.g., pain and suffering) might best be addressed by changes in personal injury protection (PIP) laws,² antifraud efforts,³ transparency in medical pricing or civil justice reform. Legal and regulatory characteristics also affect the cost of insurance.

We find that the affordability of auto insurance is unrelated to the structure of auto insurance markets. Auto insurance markets are highly competitive, and insurer profits have not risen with the cost of automobile insurance. Specifically, we find no correlation between the cost of auto insurance and insurer profitability. Regulating rates in a highly competitive industry is not an appropriate tool for addressing affordability. In fact, there is considerable evidence that aggressive (i.e., rate suppressing) rate regulation reduces affordability. Weiss et al. (2010) find that when rate regulation suppresses cost for the riskiest insureds, average premiums, losses and injuries increase. Moreover, we note that the concept of affordability is at odds with the stated purpose of rate regulation—that rates should not be too low

2. PIP is a modified form of no-fault auto liability coverage. Generous PIP statutes in certain jurisdictions appear to be associated with higher insurance cost. Michigan just altered its generous PIP statute to allow customers to lower their premiums by choosing lower levels of benefits if they desire.

3. Hoyt, et al. (2006) show that several state laws reduce trends in auto insurance fraud.

(inadequate), too high (excessive) or unfairly discriminatory (based on something other than expected losses).

The remainder of the article proceeds as follows. In the second section, we describe factors affecting the cost of auto insurance. In the third section, we discuss strategies for reducing the cost of insurance. In the fourth section, we review and discuss the topic of insurance affordability. In the fifth section, we demonstrate the effects of flawed assumptions and analyses in several existing affordability studies. In the sixth section, we discuss the use of rate regulation to improve affordability. The final section summarizes our conclusions.

Factors Affecting the Cost of Insurance

Many factors can affect the cost of automobile insurance. We first examine whether changes in insurance prices are related to changes in the losses, expenses or profits of insurance companies. We then consider the underlying factors associated with changes in each category.

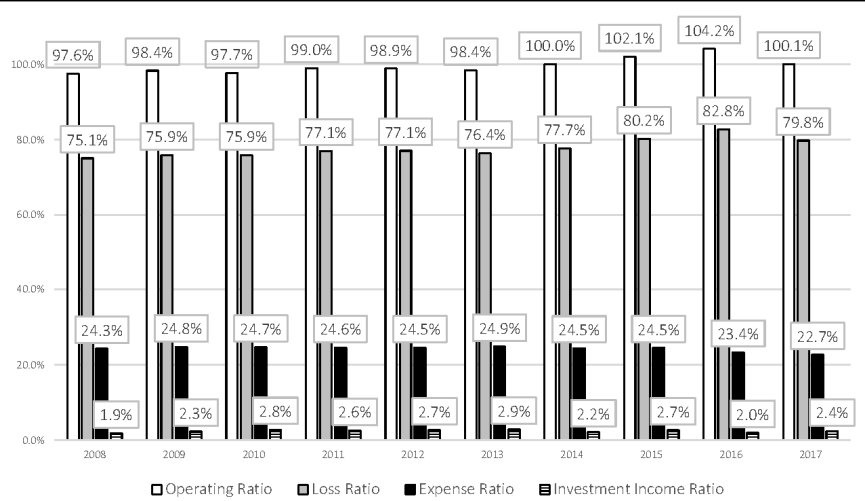
Automobile insurance pays for bodily injury and property damage resulting from the ownership and operation of automobiles. Payment is governed by policy forms and business practices that are enforced by state law. Thus, it covers legal defense in the event a driver is sued. In addition to payments made under insurance contracts, an insurer must cover its expenses, which include underwriting, loss adjustment, sales and marketing, taxes, and general overhead. The cost of automobile insurance must naturally reflect the costs of these goods and services. Expenses are offset by investment income earned on funds held as loss reserves and unearned premiums reserves and policyholders' surplus. Finally, the cost of insurance must include a profit margin that represents a return on capital commensurate with risk retained by insurers.

Figure 2 demonstrates changes over time in the losses, expenses, investment income and profits of the auto insurance industry. Each is shown as a percentage of net premiums earned. The loss ratio is the ratio of losses and loss expenses—incurred losses, loss adjustment expenses (LAE), and defense and cost containment expenses—to net premiums earned. The expense ratio is non-loss expenses—underwriting, general, marketing and tax expenses—to net premiums earned. The investment ratio is the return on investment funds attributable to insurance transactions to net premiums earned. The operating ratio represents overall insurer performance. It is calculated as losses plus expenses minus investment returns, divided by net premiums earned. An operating ratio greater than 100% indicates an operating loss, while a ratio of less than 100% indicates an operating gain.

All four ratios appear steady from 2008 to 2013. After 2013, the loss ratio increases (through 2016), and the expense ratio decreases. The increase in the loss ratio outweighs the decrease in the expense ratio, causing overall performance to weaken (i.e., the operating ratio increases above 100%). The last four years of the analysis (2014–2017) show zero or negative profit. In examining Figures 1 and 2, it is evident that while automobile insurance costs are steadily increasing over the time period examined, the profitability of auto insurers is not. In fact, the profits of auto

insurers are decreasing, suggesting that the increasing cost of auto insurance is likely not due to insurers extracting excess rents from consumers. We also see little change in investment returns.⁴

Figure 2: Operating Performance and Expense Categories Relative to Premium



Source: NAIC data sourced from S&P Market Intelligence

Notes: Operating ratio is losses plus expenses minus investment gains as a percentage of premium.

Next, we examine the correlations of the ratios. We find the correlation coefficient for the loss ratio and the operating ratio is 0.97. In addition, the correlation coefficient for the expense ratio and the operating ratio is -0.54 and the correlation coefficient for the investment income ratio and the operating ratio is -0.29. The correlations further suggest that losses are likely the root cause of rising insurance costs.

Several underlying factors are correlated with the increasing levels of auto insurance losses. These factors include: 1) the number of miles driven; 2) medical cost inflation; 3) the cost of repairing a vehicle; and 4) the prevalence of distracted driving.⁵ We address each factor in turn.

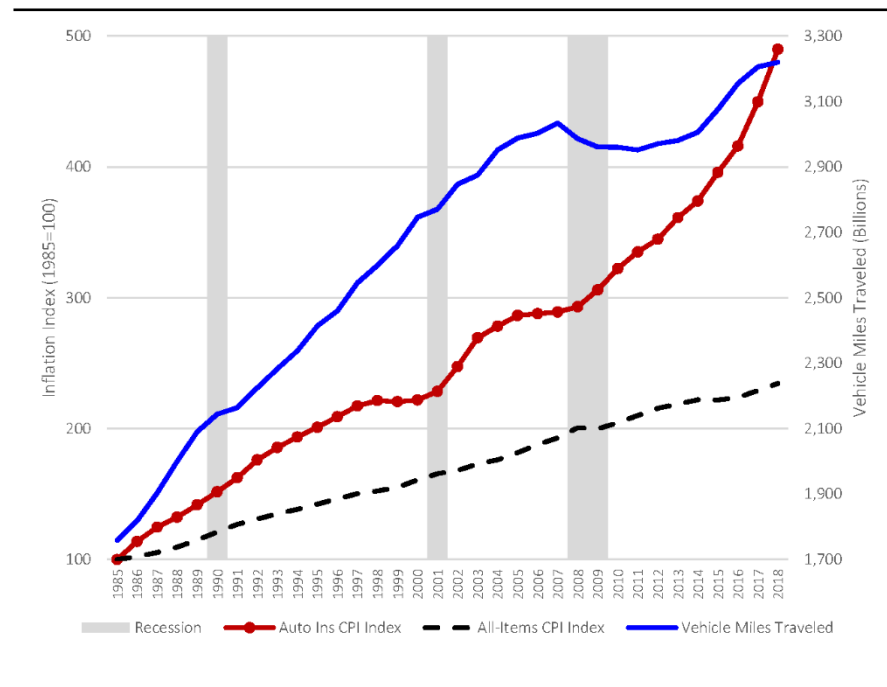
First, the number of miles driven has grown quickly as the economy expanded following the “Great Recession.” Figure 3 shows the number of vehicle miles driven

4. Investment returns for the entire period considered in Figure 2 are at or near historical lows. The low interest rate environment likely increased pressure on insurers to raise auto insurance prices, but returns did not change.

5. There are many other factors—e.g., driving under the influence of alcohol and drugs, speeding, fraud and uninsured motorists—that affect the cost of auto insurance but do not change substantially during the study period.

annually from 1985 through June of 2018. The years in which the U.S. economy was in a recession are shaded in grey. The figure shows that vehicle miles traveled increases steadily from 1985 to 2006 and then drops from 2007 to 2009. Miles driven remain relatively flat from 2009 to 2013 and increases thereafter. Figure 3 also shows inflation—general inflation and auto insurance inflation—over the same time period. The correlation between auto insurance inflation and the number of miles driven is 0.92. It appears that the rate of auto insurance inflation decreases when economic recessions decrease the number of miles driven. During the time of sharp increase in auto insurance costs between 2011 and 2018, there is also an increase in miles driven as the U.S. economy rebounded from a recession.

Figure 3: Miles Driven and the Cost of Auto Insurance



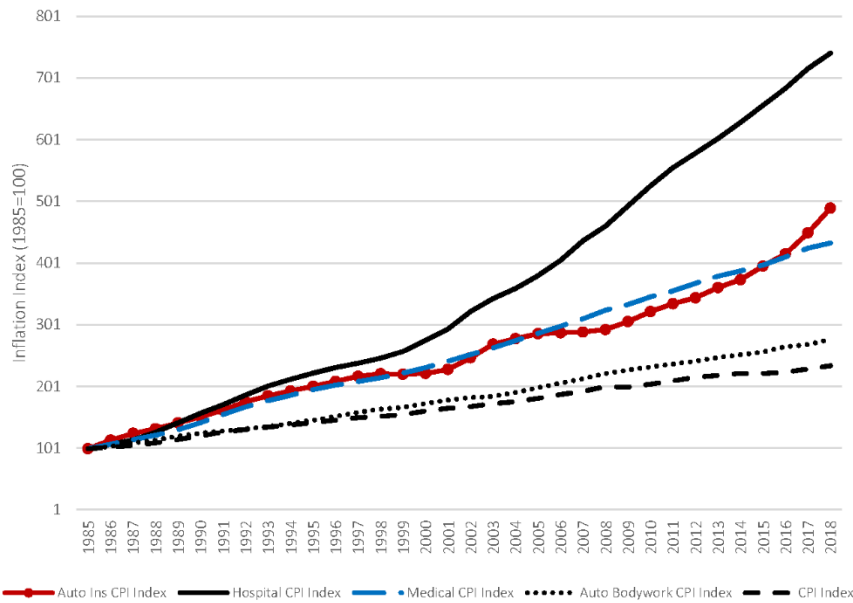
Sources: Bureau of Labor Statistics, National Bureau of Economic Research and U.S. Department of Transportation

Second, medical costs have grown over time. Figure 4 shows inflation indices for auto insurance, hospital services, medical services and auto bodywork from 1985 through 2018. The cost of automobile insurance is highly correlated with medical inflation ($\rho=0.986$). This correlation is noteworthy because only 32% of losses involve bodily injury.⁶ Bodily injury losses are not divided proportionally across all

6. See Figure 6 below.

types of medical care. Therefore, it is possible that the types of medical care provided to crash victims face a systematically higher inflation rate than medical care in general. In fact, a large percentage of auto insurance injury claims involve hospital treatment, which has risen in cost much faster than other medical services.⁷ Villaveces et al. (2013) find that vehicle crashes account for 2,765,900 emergency department visits in 2010. While one crash often sends more than one person to a hospital, the NAIC *Auto Insurance Database Report* only shows 1,715,569 bodily injury claims in 2010.⁸ Another exacerbating factor is cost shifting, when medical providers charge private payers, such as auto insurers, inflated higher rates than they charge to other payers such as private health insurance, Medicaid and Medicare (IRC, 2010). Therefore, it seems auto insurers pay more than other payers for medical services because they incur relatively expensive types of medical services (e.g., hospital services), or they pay a higher price for the same services, or both.

Figure 4: Auto Insurance Inflation Components



Source: Bureau of Labor Statistics

7. This may be due, in part, to the variations in first-party coverages across states as some states, such as Michigan, have very generous first-party medical benefits. This is discussed more later in this section.

8. The NAIC *Auto Insurance Database Report* does not include claims frequency from Massachusetts or Texas.

Third, the cost of automobile collision repair has increased substantially from 1985 to 2018. The increase in the cost of automobile collision repair is due to the cost of new safety and efficiency technology available in vehicles. In recent years, automobile manufacturers have increased the use of special materials to improve fuel efficiency. For example, substituting aluminum for steel in the body of a vehicle can reduce the weight of a vehicle by up to 60% without compromising strength or durability. Several other materials have similar effects. However, these materials are more expensive to manufacture and install, sometimes requiring additional equipment and training. The percentage of claims involving special materials has grown from 3% in 2004 to nearly 20% in 2017 (Littooy, 2017a). This affects the cost of insurance because special materials increase the severity of property damage claims by an average of 15.7%.

Safety technology also affects claim severity. As manufacturers add sensors and cameras to help drivers avoid crashes, they add expense to repairs when these cars do crash. Littooy (2017b) finds that crash avoidance technology available in popular 2016 and 2017 model-year vehicles increases the average cost to repair front-end collision damage by 25% and rear-end collision damage by 10%, compared to the previous model year. While the average cost increase is substantial, the increase for certain vehicles is striking. For example, the cost of repairing a front-end crash on a 2016 Nissan Maxima increased by 132% (from \$2,915 to \$6,752) compared to the previous model year, which did not offer front-end collision avoidance sensors. Similarly, the cost of repairing a rear-end collision on a 2016 Toyota Prius increased by 75% (from \$1,969 to \$3,452) compared to the 2015 model.

Importantly, it is beyond the scope of this study to pass judgment on the use of special materials or safety features. Both offer value to consumers and society. Nonetheless, discussion of auto insurance costs is not complete without including these topics.

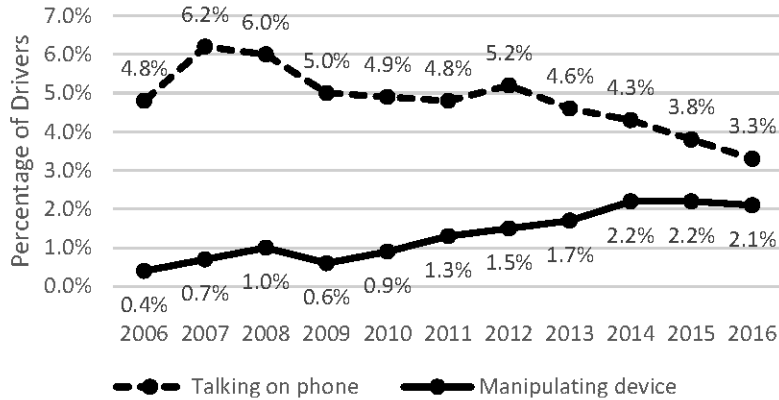
Fourth, distracted driving continues to be a problem. Figure 5 shows the percentage of drivers on the road at any given moment during a day who are talking on a cell phone or using an electronic device. The estimated total number of drivers at a given moment is 14,582,790. Thus, in 2016, there were $(14,582,790 \times 3.3\%) = 481,232$ drivers talking on cell phones at any given moment. While the percentage of drivers talking on cell phones when driving is trending downward, the percentage of drivers manipulating a mobile electronic device is rising. Given that young drivers are most likely to use mobile devices while driving, it is possible this problem will worsen over time if youth signals a new paradigm of electronic device habits, rather than lack of maturity or experience.

Reducing the Cost of Auto Insurance

There are many potential strategies for reducing the cost of auto insurance. Seatbelts and airbags reduce the severity of bodily injury losses but do nothing to limit the frequency of accidents. Antilock brakes, lane sensors, blind spot monitors

and collision avoidance systems reduce loss frequency but increase property damage severity. Improving road infrastructure (e.g., installing roundabouts, widening lanes and reducing speed limits) can reduce loss frequency and severity, but it is expensive and can be politically challenging. Considering the tradeoffs involved in any given strategy is crucial to successful public policy.

Figure 5: Electronic Device Usage While Driving



Source: Pickrell and Li, 2017

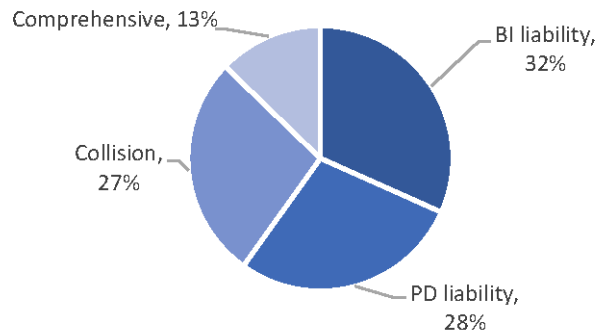
Figure 6 shows the breakdown of insurance losses by type of coverage in 2017. Bodily injury losses are 32% of total losses, and property damage losses are 68%. However, within the category of liability insurance—the only mandatory coverage—bodily injury losses are 53%, with property damage representing the remaining 47%. Thus, efforts to reduce property losses might have the largest overall effect, but a reduction in bodily injury costs would give the greatest relief for mandatory coverage. This difference is important because purchase requirements are cited frequently in calls to address affordability (FIO, 2017).

Figure 7 demonstrates the effects of frequency and severity on changes in loss costs by the type of coverage. Data are available for five types of coverage: 1) collision; 2) comprehensive; 3) property damage liability; 4) bodily injury liability; and 5) PIP coverage.⁹ Collision insurance covers damage to the insured’s automobile when it overturns or collides with another object. Comprehensive coverage generally pays for damage to the insured’s automobile that occurs when it is not being driven. Examples include theft, fire, flood and vandalism. Property damage liability coverage pays for damage to a third party’s property for which the insured is legally liable. Bodily injury liability coverage pays for bodily injury to a

9. Data are not available for uninsured and underinsured motorist coverage.

third party for which the insured is legally liable. In states with PIP laws, PIP coverage pays for bodily injury sustained by the insured, regardless of fault, up to a specified threshold.

Figure 6: Auto Insurance Losses by Coverage Type



Source: NAIC data from S&P Global Intelligence and ISO Fast Track Circular

Notes: “BI liability” is liability insurance for bodily injury. It includes PIP losses, which are approximately half of all bodily injury losses in states where PIP is mandatory. “PD liability” is liability insurance for property damage. “Collision” and “comprehensive” are first-party property coverage. Total amounts for liability and first-party property are from the NAIC. The finer categories are set using pure premium estimates from ISO Fast Track.

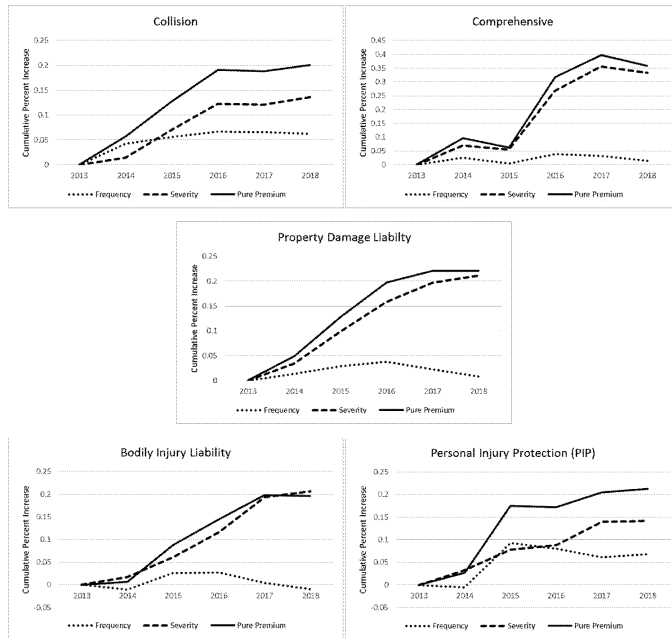
In Figure 7, we see a few common patterns. For each coverage type, loss severity increases sharply from 2013 through 2016 and then levels off through 2018. For collision and PIP coverage, loss frequency increases early and levels off at a new higher rate around 2016. For the other coverages, frequency increases but trends back to 2013 levels by 2018. These patterns can be instructive for policymakers. For example, PIP coverage exhibits large increases in frequency and severity of loss (in contrast to the stated intent of PIP). It seems clear that eliminating PIP laws in states where they exist could reduce the cost of auto insurance.¹⁰ The cost of bodily injury liability coverage is driven by claim severity, rather than frequency, in recent years. This observation suggests efforts to reduce medical costs could be effective in reducing auto insurance premiums.

Because insurance markets are competitive and average profits are thin, it is not logical to address the cost increases with rate regulation. Likewise, efforts to reduce property loss severity are ill-advised because they are likely to involve making cars

10. A large literature concurs that PIP increases the cost of auto insurance. Incentives created by the PIP systems cause increased costs. Therefore, eliminating PIP would not simply shift this expense to other coverages in the policy. See Derrig et al. (1994), Harrington (1994), Cole et al. (2004), Anderson et al. (2010), PARI (2012) and others.

either less safe or less fuel-efficient. However, Karl and Nyce (2019) find that laws limiting the use of handheld cell phones while driving—even when enforcement is limited—reduce auto insurance losses and premiums. Efforts to further pass, strengthen and enforce these laws have the potential to reduce loss frequency in each coverage category.

Figure 7: Changes in Frequency, Severity and Pure Premium by Coverage, 2013–2018



Source: ISO Fast Track data

Notes: Each graph shows the cumulative percentage change compared to base year 2013. Data for 2018 only reflect the first six months of the year.

Civil justice reform can potentially reduce the severity of bodily injury losses in liability and PIP claims. Legislation that reduces incentives to inflate claims in a PIP system, or reduces the amount available to plaintiffs as non-economic damages (e.g., pain and suffering) in the liability system, can reduce the cost of insurance (Grace and Leverty, 2013).

Auto Insurance Affordability

Low-cost transportation enhances consumers' standard of living by reducing the cost of nearly everything in the economy. Low-cost transportation also expands opportunities, such as access to employers and the choice of employers. Transportation in America is synonymous with automobiles, and American consumers' preference for traveling in their automobiles has only increased over time. The auto's share of work trips has climbed from 72.5% in 1960 to 90% in 2009 (Winston, 2013). The Bureau of Economic Analysis reports that Americans spent \$1.33 trillion on gasoline and vehicles in 2018.

Because a vast majority of Americans rely on automobiles for their transportation and transportation often determines a consumer's economic opportunities, the affordability of driving has received expanded attention of late. This recent attention has mostly focused on one component of the cost of automobile transportation, automobile insurance and, in particular, on whether automobile insurance has become less affordable for different segments of the population. Total net premiums written in 2018 on private passenger automobile insurance in the U.S. was \$242.7 billion (\$145.8 billion for liability insurance and \$96.9 billion for collision/comprehensive insurance; Source: NAIC data). Thus, total premiums on personal automobile insurance in 2018 are 10.93 percent of the \$1.33 trillion spent on gasoline and vehicles.

As driving increases, the cost of auto insurance increases. More cars on the road increase the probability of accidents. More miles driven also increase the probability of accidents. The cost of auto insurance has increased at the same time that driving has increased.

Existing Affordability Studies

All states require a driver or owner of an automobile to have liability insurance or financial security that may be satisfied by auto liability insurance (Insurance Information Institute, 2016) as a condition for registering and driving a car. As such, automobile insurance, and specifically, the affordability of automobile insurance, has been the source of a great deal of research. However, the existing literature on auto insurance affordability is diverse (Harrington, 2002; Tennyson, 2012), and there is little consensus on a single method of defining affordability given available data (Hartwig et al., 2014). Our paper does not try to fill this void. Instead, we discuss how the assumptions made in prior studies lead to their conclusions. We also show that some common assumptions are flawed.

A number of recent studies attempt to examine the affordability of auto insurance. These studies measure the cost burden on an auto owner of having to buy auto insurance by using an income approach—comparing expenditures on auto insurance to income. According to this approach, auto insurance is assumed to become unaffordable when the cost burden becomes excessive relative to income. Although a lower insurance premium is obviously more affordable than a high

premium, no obvious threshold separates affordable premiums from unaffordable premiums and thus defines affordability.

There are two types of studies that examine the affordability of auto insurance. The first style of study makes an arbitrary judgment of what constitutes affordability. The most notable study of the first variety is the *Study on the Affordability of Personal Automobile Insurance* by the Federal Insurance Office (FIO, 2017). The FIO endeavored to study the extent to which traditionally underserved communities and consumers, minorities, and low- and moderate-income (LMI) persons have access to affordable automobile insurance. The FIO calculated an auto insurance affordability index at the ZIP Code tabulation area level. The affordability index is defined as the ratio of the average annual written premium in personal automobile liability in the voluntary insurance market to the median household income (based on U.S. Census Bureau data) in a ZIP Code. The FIO did not study all ZIP Codes; rather it limited its analysis to ZIP Codes in which Affected Persons (AP) were 50% or more of the population. AP is defined as low to moderate income and majority-minority ZIP Codes.¹¹ AP ZIP Codes represent 28% of all ZIP Codes nationwide.

The FIO defined personal auto insurance in a ZIP Code as “unaffordable” if its affordability index is equal to or greater than 2%. The FIO selected this threshold because the 2013 and 2015 versions of the Bureau of Labor Statistics’ Consumer Expenditure Survey found that the average consumer in the U.S. spent about 2% of average income (after taxes) on vehicle insurance. The FIO determined that nationwide, there were 845 AP ZIP Codes with an affordability index value above 2%. These 845 ZIP Codes represent 9.2% of the 9,172 AP ZIP Codes and 2.6% of the 32,452 ZIP Codes nationwide (at the time of the FIO study). The total population in the 845 AP ZIP Codes is approximately 18.6 million.

There are several weaknesses with the FIO’s approach. First, the threshold for “unaffordable” is arbitrary. There is no economic justification for selecting a 2% threshold. Second, a definition of “unaffordable” that is relative to a national average will always deem auto insurance as unaffordable for some ZIP Codes. For example, if the auto insurance expenditure to income ratio is normally distributed with a mean of 2%, then the FIO definition will always deem 50% of ZIP Codes “unaffordable” and the other 50% as “affordable,” regardless of the magnitude of the premium. With this definition, premiums could uniformly drop by 30% in all ZIP Codes, and 50% of ZIP Codes will still be classified as “unaffordable” and the other 50% as “affordable.”

11. The FIO defines a ZIP Code as “majority-minority” if the minority population (“Black American, Native American, Hispanic American or Asian American”) in a ZIP Code exceeds 50% of the total population of that ZIP Code. A ZIP Code is “low-income” if it has a median family income less than 50% of the median income of the Metropolitan Statistical Area (MSA) for that ZIP Code. A ZIP Code is “moderate-income” if the ZIP Code has a median family income between 50% and 80% of the MSA median income.

Third, the FIO and consumer advocate groups use the findings to suggest that APs are unfairly harmed by high auto insurance premiums.¹² The study, however, does not compare AP ZIP Codes with non-AP ZIP Codes, making it impossible to draw such conclusions.

Fourth, the FIO correctly acknowledges a limitation of its approach: “The affordability index allows for comparison of ZIP Codes within the same state, but should not be considered for interstate analysis.” Interstate comparisons are inappropriate because there are wide variations among states in terms of laws (e.g., required financial responsibility limits¹³ or state mandates for PIP coverage), medical utilization rates, fraud, regulations and policies (e.g., state programs that offer low-cost auto liability insurance or help low-income and other drivers obtain more affordable auto insurance; health and safety measures such as highway safety initiatives). The FIO, however, does not acknowledge that these variations also influence the national average of auto insurance expenditure to income ratio, which determines its threshold for “unaffordability.”

To avoid the inherent subjectivity involved in ascribing a specific threshold at which auto insurance is judged unaffordable, the second style of auto insurance affordability study examines how the ratio of auto insurance expenditure to income varies over time. There are three recent studies of this style (Schmid, 2014; Insurance Research Council, 2015; and Brobeck and Hunter, 2015). Schmid (2014) finds a gradual improvement in auto insurance affordability from the 1990s to the 2000s. The Insurance Research Council (IRC) study finds that the average U.S. consumer spends about 1.5% to 1.6% of his or her income on auto insurance. It also finds that the expenditure-to-income ratios are similar for individuals in the two lowest income quintiles (which the report defines as LMI consumers). Moreover, the study finds that auto insurance has become more affordable over time—from the 1990s to the mid-2010s. Brobeck and Hunter (2015) reach a conclusion different from the other two studies. Using different methods and data than the other two studies, they conclude that auto insurance affordability has not changed over time for moderate-income households (second income quintile) and has worsened for low-income households (first income quintile).

While this style of study represents a slight improvement over studies evaluating levels of an affordability ratio, it still lacks a foundation for determining if a given ratio of premium to income is “affordable.” For example, if the cost of insurance in a given jurisdiction is very affordable in year one, and then it increases for 10 years in a row, it could still be affordable in year 10. Moreover, none of these studies control for the availability and cost of alternative forms of transportation. If other forms of transportation are available, the importance of affordability of auto insurance decreases.

12. See for example, https://consumerfed.org/press_release/new-treasury-dept-report-reveals-18-million-americans-live-zip-codes-auto-insurance-unaffordable/.

13. The 2018 Automobile Financial Responsibility Laws by State: <https://www.iii.org/automobile-financial-responsibility-laws-by-state>.

Analysis of Affordability

In this section, we analyze auto insurance cost and affordability while being mindful of the criticisms of the existing studies mentioned above. We begin by observing levels and trends in the cost of auto insurance and its relation to income. Next, we repeat the FIO (2017) analysis, but we control for one additional factor, the availability of alternative transportation (AT). This step highlights the downside of the FIO's over-simplified analysis. The purpose of this section is to show how reasonable changes in assumptions regarding the definition of income can lead to different conclusions about the level of affordability.

Income and Affordability

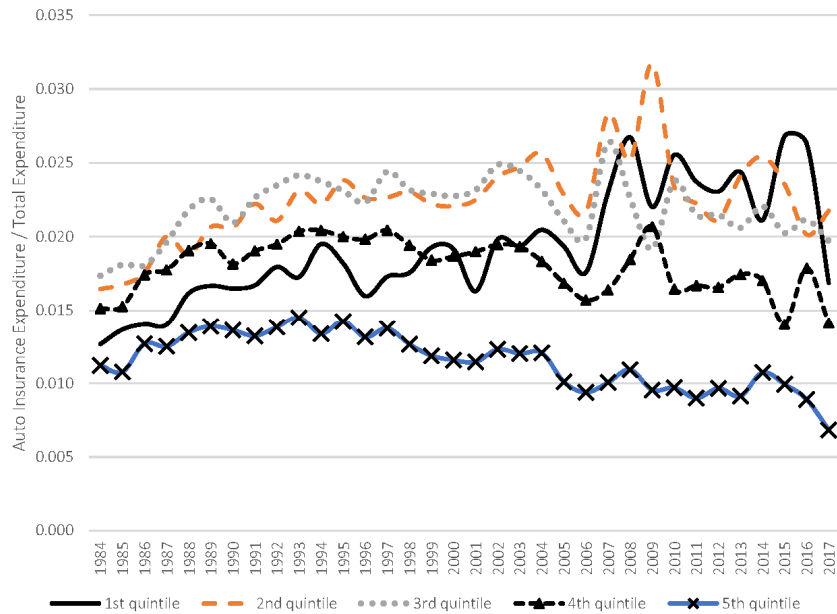
From the consumer's point of view, there are two ways of looking at auto insurance premiums. The first is the absolute dollar cost, and the second is the relative amount spent compared to other items in the consumer's budget.

In Figure 8, we look at auto insurance expenditures as a percentage of total expenditures or pre-tax income [insurance premiums / (maximum of total expenditures or pre-tax income)]. Our measure differs from existing studies, which consider the ratio of insurance premiums to pre-tax income in each income quintile (e.g., Brobeck and Hunter, 2015; and Schmid, 2014). Insurance expense to total expenditures is the better measure of affordability because it recognizes spending from retirement savings and income from some public sources (e.g., housing assistance) to people in the first three income quintiles, whose total expenditures exceed total pre-tax money income.

Note that after controlling for expenditures, auto insurance is more affordable for the first income quintile than for the next three quintiles from 1984 through 2003. In the following years (2004–2018), the average ratio increases for the lower three quintiles, but there is still substantial overlap across these three income groups. In 2018, the ratio was lower for the first quintile than for quintiles two and three.¹⁴

In contrast to results presented in other studies, we see that the measure of premium relative to available resources is stable for most consumers across income quintiles. For the upper-income quintile, we see that the percentage of income spent on auto insurance is relatively stable at around 1%. While auto insurance premiums as a percentage of total expenditure did increase for the first three income quintiles around 2006, the post-2006 trend for this affordability measure is decreasing for each income quintile. This reinforces the notion that premiums are volatile as they must cover the costs of policyholders' losses. The costs to cover injuries and to repair and replace damaged property are also volatile, and this is seen in how expenditures change over time.

14. The types and amount of coverage purchased may vary by income. To the extent that individuals in the lower quintiles have lower limits or less coverage, the primary concern may not be affordability of coverage but the adequacy of coverage. However, an in-depth discussion of this issue is beyond the scope of this paper.

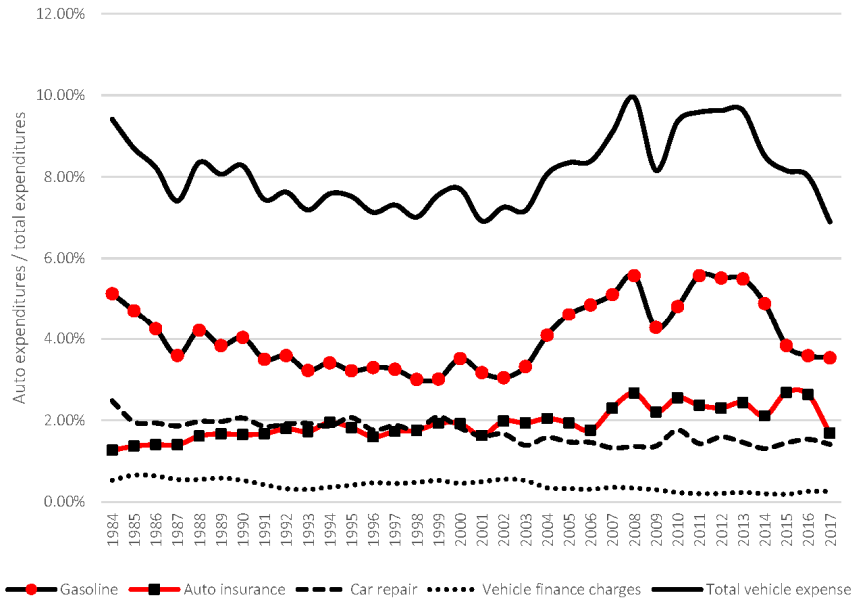
Figure 8: Relative Auto Insurance Expenditures by Income Quintile

Source: Consumer Expenditure Survey from <https://www.bls.gov>

Note: The denominator is the greater of total expenditures and pre-tax money income. For the first three income quintiles, total expenditures are greater than pre-tax income.

Figure 9 shows the expenditures typically related to automobile ownership divided by total expenditures over time for those in the first income quintile. Auto insurance is just one component of the cost of driving. Figure 9 shows all the costs of auto ownership, which include insurance, gas, repairs and financing. Overall, the cost of gasoline is the highest expenditure component of the cost of driving and the cause of most of the volatility in the cost of driving. But for volatility in the price of gasoline, the cost of driving would be remarkably stable over time. Vehicle repair and maintenance and auto insurance are the second and third largest expenditures. Currently, auto insurance takes up a greater proportion of a consumer's budget than auto repair and maintenance, but that was not always the case. Finance charges have been especially low in recent years, reflecting the low-interest rate environment. Given that the cost of auto insurance is not the only—or even the largest—cost associated with driving, it is not logical to suggest that auto insurance is unaffordable when it is greater than X% of income, yet the total cost of operating a car is often much higher than X%. Even if auto insurance were free, the cost of transportation would fluctuate over time by more than 2% of income for consumers in the first quintile.

Figure 9: Vehicle Expenses for First Income Quintile



Source: Consumer Expenditure Survey from <https://www.bls.gov>

Affordability Over Time

Figure 9 shows that the cost of automobile ownership changes over time. An interesting question is whether we can accurately evaluate affordability over time when both the cost *and the value* of a good changes. This question is especially relevant to automobile expenses as technology has greatly enhanced the safety profile of automobiles over time. For example, the Insurance Institute for Highway Safety (IIHS) crashed a 1959 Chevrolet Bel Air into a 2009 Chevy Malibu to compare their safety profiles. Both of the sedans were popular at the time of their manufacture. The results were dramatic. The driver of the Bel Air would have suffered severe injuries, while the driver of the modern car would have suffered minor, if any, injuries.¹⁵ Modern cars provide transportation services like older cars, but they do so at a lower expected cost of injury or death. Such technology is costly, thereby increasing the cost of insurance. However, we cannot conclude that auto insurance has become less affordable unless we can simultaneously adjust the value

15. See <https://www.youtube.com/watch?v=fPF4fBGNK0U> for a Consumer Reports video and short commentary on this test.

of transportation to reflect changes in safety. Therefore, we must exercise caution, even when evaluating affordability based on changes in cost over time.

Alternative Transportation Analysis

The availability and cost of AT is an important factor when considering the affordability of automobile insurance. Examples of AT include public transportation, telecommuting, ridesharing, livery services (e.g., taxi or ride-hailing service), delivery services and walking communities. Although AT does not necessarily change the affordability of insurance, when alternative modes of transportation are available, the cost of driving, including the cost of automobile insurance, becomes less important as a public-policy issue.

The aforementioned FIO study (FIO, 2017) attempts to estimate the number of people in low to moderate income and majority-minority communities that do not have access to affordable automobile insurance. While we have a host of concerns about the nature and execution of the FIO analysis, it represents one example of a public effort to measure the affordability of auto insurance in these communities. As such, it can serve as a useful baseline analysis to which we can compare alternative specifications.

The FIO (2017) notes that driving one's own vehicle provides advantages over public transit in many locations. Specifically, the FIO claims there are many jobs that low-income people cannot reach via public transit within 90 minutes. However, there are many places where people do ride public transit, walk or ride a bicycle to work. In such places, the affordability of auto insurance is less important than in places where an automobile is necessary for employment. Rather than dismiss these possibilities, we measure the effect of alternative transportation on the results from the FIO (2017) analysis.

We begin with the data and results provided by the FIO (2017).¹⁶ These data identify ZIP Codes in which a majority of people are minorities or low-to-moderate income. Residents of these ZIP Codes are labeled AP. They also provide the ratio of average auto insurance premium to median income, called the affordability index (AI). If the AI in an AP ZIP Code is greater than 2%, the ZIP Code is labeled an AI ZIP Code. We merge these ZIP Code level data with variables from the 2015 American Community Survey describing the population and commuting habits of workers by ZIP Code.¹⁷ For each ZIP Code, we calculate the number and percentage of workers who commute to work using an alternative form of transportation.

We use two measures to capture the effects of AT on affordability. The first is the percentage of workers who use AT. People who use AT obviously have access to AT. We then reduce the population of people in AI ZIP Codes by the percentage of workers using AT.

16. The spreadsheet is available from www.treasury.gov/initiatives/fio/reports-and-notice/documents/final_data_for_2016_fio_us_auto_affordability_analysis.xlsx.

17. It is not clear which population estimate the FIO uses in its study. Our results using 2015 ACS population data are very similar, but not identical, to results in the FIO study. We do not expect this difference to bias results.

The second measure recognizes that AT may be available as a substitute for driving, even for people who do not use it currently. We assume that if 25% of workers in a ZIP Code use AT to commute to work, it is available to everyone in the ZIP Code. We drop these ZIP Codes from the sample and recalculate the number and population of AI ZIP Codes.

Table 1 presents the results of these analyses. In the first AT scenario, the estimated number of people struggling to afford auto insurance drops by 31% (from 18,859,649 to 12,992,220). This estimate represents 4.1% of the U.S. population, in contrast to 5.1% in the FOI (2017) analysis. As expected, our second AT adjustment has a larger effect. When we exclude ZIP Codes where at least 25%¹⁸ of residents commute to work via AT, the estimate of AI population drops to 9,638,546, or 3% of the U.S. population.

Table 1: Results of Affordability Analysis with Alternative Transportation

Population	# U.S. Zip Codes	% U.S. Zip Codes	% AP Zip Codes	Total Population (1,000s)	% U.S. Population	% AP Population
Total U.S.	32,989	100%	N/A	320,084	100%	N/A
AP Zip Codes	9,172	28%	100%	112,801	35%	100%
AI Zip Codes	845	2.6%	9.2%	18,860	5.9%	16.7%
AI Zip Codes, Population not using AT	845	2.6%	9.2%	12,992	4.1%	11.5%
AI Zip, AT Unavailable	564	1.7%	6.1%	9,639	3.0%	8.5%

Sources: FIO (2017) and 2015 American Community Survey (5-year estimates)

Notes: ZIP Codes are actually Zip Code Tabulation Areas (ZCTA). AP ZIP Codes have a majority of residents who are minorities or low-to-moderate income. AT is alternative transportation. Population not using AT indicates AI ZIP Code populations are reduced by the percentage of workers using AT. AT unavailable indicates the populations of AI ZIP Codes are omitted with at least 25% of workers using AT.

While this affordability estimate shares nearly all of the flaws in the FOI’s (2017) estimate, our analysis indicates that it is important to consider the availability of alternative transportation—and potentially other factors—when attempting to measure the affordability of auto insurance.¹⁹

18. The 25% cutoff is necessarily arbitrary. Increasing or decreasing this limit would probably affect results, but not the conclusions.

19. Alternative transportation may be used by those in densely populated areas because it is a more efficient mode of transportation. It could also be less expensive when you consider commuting costs, including the cost of parking in some areas.

Addressing Affordability with Rate Regulation

The current focus on affordability is only the latest manifestation of the recurring concern that auto insurance premiums are “too high” and must be reined in with regulation. Thus, policymakers may be encouraged or tempted to consider regulation as a solution to any perceived affordability problem. Unlike affordability, which has no objective definition, there is a long legal history of what constitutes proper insurance rates. This includes a constitutionally mandated fair rate of return for insurers. However, even with such legal and constitutional protections, regulatory rate suppression has caused market disruptions in several states.

Historically, rate regulation was designed to make sure that rates were adequate (to prevent insolvency), not excessive (to prevent potential abuse of market power) and statistically related to losses (to ensure fairness). If rates are inadequate, we would see firms leaving the market. Prices (whether regulated or market-based) would have to rise for insurers to enter. In contrast, if rates were excessive, we would see increasing numbers of firms entering a state market. If significant entry occurs, competition would naturally start to diminish premiums. Further, if premiums were unrelated to losses, firms would not be able to demonstrate compliance. Without a link to losses, rates would be arbitrary, and economic incentives would encourage firms to relate prices to costs in order to survive. All three of these constraints (along with the corresponding market incentives) keep rates where they belong. One should not overlook the strong incentives that entry and exit have in a competitive insurance market as these forces keep product prices in line with loss costs.

If state insurance regulators decide that auto insurance prices are “unaffordable” and put an arbitrary limit on premiums that are related to an insured’s income, then insurers will exit the market rather than write coverage at a loss. History offers several examples of what happens when state insurance regulators suppress rates for the riskiest insureds.²⁰ In Massachusetts, strict regulation reduced the number of insurers in the state (Tennyson, Weiss and Regan 2002). In New Jersey (Worrall, 2002) and South Carolina (Grace and Klein, 2002), firms left the market due to strict price regulation in auto insurance, and the price of auto insurance increased. Finally, the Florida homeowners insurance market has gone through ups and downs as the state has restricted the ability of homeowner insurers to make a fair return over time. All of these policies were enacted to improve the “affordability” of insurance for high-risk drivers or homeowners. The result in every case was a failed market with fewer firms, higher prices and upset voters.²¹

20. In addition to limiting rates, state insurance regulators in some states restrict the use of certain rating variables, such as credit-based insurance scores, to address affordability. Restricting the use of an accurate rating factor and capping accurate insurance rates have similar effects on insurance markets.

21. Born et al. (2018) find that “under ‘normal circumstances,’ insurers find ways to work around or ameliorate the effects of tight constraints on their rates and/or long delays in getting them approved.” This suggests that the effects of rate regulation may be somewhat muted in some markets.

Despite the difficulties we describe in defining and measuring affordability, if lawmakers believe that automobile insurance is not affordable, there are public-policy alternatives to rate regulation that are better suited to address this potential problem. For example, a means-tested subsidy funded by a broad tax base would minimize the dangerous incentive effects of cross subsidies.

Finally, there is a large body of academic research that finds automobile insurance markets do not need rate regulation to function efficiently (see e.g., Tennyson, 2012; Tennyson, 2013; and Schwarz, 2018). In fact, a vast majority of this research indicates that auto insurance markets without rate regulation perform better on a wide range of measures than auto insurance markets with rate regulation (see e.g., Cummins, 2002). There is also considerable evidence that when rate regulation suppresses costs for the riskiest insureds, average premiums, losses and injuries increase (Weiss, et al., 2010). In sum, because insurance markets are competitive, average profits are thin and cross subsidies increase average losses through risk-taking incentives, it is not logical to address cost increases with rate regulation.

Conclusions

Auto insurance premiums increased in nominal terms from 1985 to 2018. The rate of inflation has increased in recent years as the economy recovers from the “Great Recession” and the volume of miles driven returns to familiar levels. Other likely causes of cost increases include increasing levels of distracted driving and the cost of repairing vehicle features that improve crash safety and fuel efficiency. While premiums are increasing, we show that they are correlated with the underlying costs of paying for expected losses, such as the costs of medical, hospital and auto repair services. Our results suggest that the inputs to the cost of covering losses are increasing over time, and profit levels are steady or decreasing. Thus, the pressure on auto insurance premiums is not likely due to changes in insurers’ profit expectations or their ability to set prices.

Given the inherent difficulties in measuring affordability that we discuss above, we are not able to determine definitively if auto insurance is affordable. However, we show that flawed assumptions related to common affordability measures have large effects on the results and conclusions of other studies. We find that insurance premium to income ratios are relatively stable over time. We also find these ratios are not driven by insurer profits.

We show that the ratio of auto insurance cost to pre-tax income—a common measure of affordability in other studies—is biased because income does not include spending one’s retirement savings or student loan proceeds. By analyzing the ratio of insurance premium to total expenditures, rather than pre-tax income, we find that auto insurance affordability measures for people in the lowest income quintiles are significantly overstated.

We point out that auto insurance is only one (relatively small) piece of the total cost of transportation. In fact, it is possible for driving to be “unaffordable” (albeit by an arbitrary classification), even if auto insurance were free, highlighting the

importance of a properly framed research question. Likewise, we show that controlling for the availability of alternative transportation has a substantial effect on results from existing studies of auto insurance affordability.

Finally, we conclude that insurance rate regulation is not an appropriate public-policy tool to address affordability. Auto insurance is a necessity for many, but to shift prices based on an arbitrary income benchmark will cause a major disruption to insurance markets, raising prices for all insureds. In the recent past, attempts to improve “affordability” by reducing prices for the highest-risk drivers have shown poor results (Worrall, 2002). Such actions create incentives to take more risk because high-risk drivers do not internalize the cost of risk by paying risk-based premiums.

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Cummins, J. David and Richard A. Derrig, eds., 1989. *Financial Models of Insurance Solvency*, Norwell, Mass.: Kluwer Academic Publishers.

Manders, John M., Therese M. Vaughan and Robert H. Myers, Jr., 1994. “Insurance Regulation in the Public Interest: Where Do We Go from Here?” *Journal of Insurance Regulation*, 12: 285.

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